REMARKS

Preliminary, Applicants affirm election of claims 1-15 for prosecution, without traverse. Additionally, Applicants reserve the right to file a divisional application directed to the subject matter of the non-elected invention (claims 16-19).

Also, Applicants request the Examiner to return a copy of initialed Form PTO-1449 submitted together with the Information Disclosure Statement filed on May 5, 1999. A copy of Form PTO-1449 is attached hereto for the Examiner's convenience.

Additionally, Applicants respectfully request the Examiner to initial the bottom two entries in Form PTO-1449 submitted together with the Information Disclosure Statement filed May 23, 2000. A copy of this second Form PTO-1449 is attached hereto.

Claim 1 has been amended to incorporate therein the recitation of claims 2 and 3. Claims 2 and 3 have been cancelled.

Claim 11 has been amended to incorporate therein the recitation of claim 9.

Entry of the amendments is respectfully requested.

Review and reconsideration on the merits are requested.

Claims 1-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Otaki et al (EP 0818505 A2). Additionally, claims 14 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Otaki et al in view of U.S. Patent 5,274,024 to Koyama et al.

Applicants respectfully traverse for the reasons discussed below.

First, Applicants will clarify the characteristics of the claimed invention prior to pointing out the differences between the claims and the cited references.

CHARACTERISTIC FEATURES OF THE INVENTION

The invention of claim 1 relates to a resin composition containing an oxygen-absorbing agent. This invention is characterized in that

A. a plurality of thermoplastic resins and/or elastomers which are substantially non-compatible are used as a resin matrix;

B. the resins and/or elastomers are a propylene polymer and an ethylene polymer; and

C. the resin and/or elastomers form a layer distributed structure in the resin matrix.

The resin composition containing a metal iron as an oxygen-absorbing agent absorbs oxygen when the metal iron is oxidized. This oxidation results in expanding the volume of the oxygen-absorbing agent to 1.8 times the original volume of the particles. Due to this expansion, the oxidized oxygen-absorbing particles protrude from the resin matrix. This causes problems such as the destruction of the coating of the resin layer, and elution of the oxygen-absorbing agent into the container contents. (See page 6, lines 9-27 of the specification.)

On the other hand, in the present invention, since a blend of a plurality of non-compatible polymers such as a propylene polymer and an ethylene polymer are used, as a resin matrix, the non-compatible polymers form a layer distributed structure when the resin composition is melt-molded. When, in this matrix having a layer-like distributed structure, the oxygen-absorbing agent is oxidized to cause volume expansion, spaces are formed by peeling layers among the separated layers on the interface of a multi layer-like distributed structure. Thus, volume

expansion is absorbed, and the advantage of preventing destruction of the coating of the resin layer can be obtained. (See page 6, line 28 to page 7, line 14 of the specification.)

For example, in Example 1 of the specification, an oxygen-absorbing test was performed using a container having an interlayer obtained from a blend of 100 parts by weight of a propylene-ethylene random copolymer, 25 parts by weight of an ethylene-α-copolymer and an iron-type deoxidizer. The section of the interlayer was observed by a scanning electron microscope. As a result, a number of microseparations occurred among interfaces between layers of the multilayer distributed structure.* Furthermore, convex and concave portions of the inner surfaces of the containers were evaluated by five panelists with a rating of 5 points. (5: excellent and 1: bad) The rating given by the panelists was 4.7. (Pages 38 to 39, page 42, Table 2 in the specification)

In contrast, in Comparative Example 1 in the specification, a container was prepared by compounding an iron-type deoxidizer as an interlayer into a propylene-ethylene random copolymer alone. The container was tested in the same way as in Example 1. Convex and concave portions occurred on the surface of the container by expansion of the oxygen-absorbing agent in the interlayer. The appearance was evaluated with a rating of 2.5.

On the other hand, the invention of claim 11 relates to an oxygen-absorbing agent comprising a reducing iron powder and an oxidation promoter or a catalyst, in which the oxidation promoter or the catalyst is present in an amount of 0.1 to 5 % by weight per the reducing iron powder. This invention is characterized in that:

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* An explanatory photograph will be submitted to the Examiner as soon as it is received.

I. a layer of the oxidation promoter or the catalyst is firmly adhered to the surface of the reducing iron powder;

II. an oxygen-absorbing agent having an average particle diameter of 10 to 50 μm as measured by a laser scattering method and an aspect ratio (short axis size/long axis size) of 0.6 or below is present in an amount of at least 50%;

III. the oxygen-absorbing agent is a flat or spindle-shaped particle having a compression degree of at least 20%; and

IV. the oxygen-absorbing agent has a specific surface area of not smaller than 0.5 m^2/g and an apparent density of not larger than 2.2 g/cc.

In the invention of claim 11, the layer of the oxidation promoter or the catalyst adhering to the surfaces of the reducing iron powder is important for increasing the oxygen-absorbing speed and for preventing the occurrence of cracks or swelling of water.

With regard to this point, the present specification at page 10, lines 16 to 25 describes:

> In this specification, the layer of the oxidation-promoting agent or the catalyst firmly adhered to surfaces of the reducing iron powder means not only that the oxidation-promoting agent or the catalyst is adhered to the surfaces of the reducing iron particles but also that the layer of the oxidation-promoting agent or the catalyst remains firmly adhered on the surfaces of the reducing iron powder without substantially being peeled off even under the condition of being kneaded together with the thermoplastic resin.

With regard to the effect of the oxygen-absorbing agent, the present specification at page 10, line 33 to page 11, line 32 describes:

> When the surfaces of the reducing iron powder are simply coated with the oxidation-promoting agent or the catalyst, 1-lie catalyst particles split off the surfaces of the reducing particles when being kneaded together with the thermoplastic resin, and the reducing iron free particles and the oxidation-

promoting agent particles or the catalyst free particles are made present in the resin composition. This also occurs even when the oxidation promoting agent is applied to the iron powder using an aqueous solution, since the oxidation-promoting agents precipitate in the form of crystals. The oxidation-promoting agent or the catalyst in the resin composition absorbs the water that has permeated into the resin. However, since a distance is maintained relative to the reducing iron particles, the reducing iron powder is not quickly oxidized and the oxygen-absorbing rate becomes small. Besides, water concentrates in the portions of the oxidation-promoting agent particles or the catalyst particles, whereby the resin composition is swollen, and the outer surface of the container becomes rugged.

In the oxygen-absorbing agent particles preferably used in the present invention, on the other hand, the layer of the oxidation-promoting agent or the catalyst stably remain being firmly adhered to the surfaces of the reducing iron particles even after melt-kneaded together with the thermoplastic resin. Therefore, the water absorbed by the oxidation-promoting agent or the catalyst readily activates the reducing iron powder, whereby absorption of oxygen is promoted by the oxidizing reaction of iron and the oxygen-absorbing rate is maintained at a high level. Moreover, the appearance is prevented from being deteriorated by the occurrence of swelling and cracks caused by the water which concentrates in the portions of the oxidation-promoting agent or the catalyst.

Furthermore, in Example 5 of the specification, when an iron powder to which NaCl is fixed was used, the amount of oxygen absorbed for one day was 0.08 cc/cm^2 and the amount of oxygen absorbed after seven days was 0.15 cc/cm^2, and the sheets had a good appearance. When a blend of an iron powder and NaCl was used (Comparative Example 5), the amount of oxygen absorbed for one day was 0.01 cc/cm^2 and the amount of oxygen absorbed after seven days was 0.04 cc/cm^2, and the sheets had an unsatisfactory appearance having concave and convex portions.

In the present invention, the use of oxygen-absorbing agent particles having a specific surface area of at least 0.5 m^2/g and an apparent density of 2.2 g/cc or below greatly influences oxygen absorbility. The effect due to these characteristics is explained at page 12, lines 11 to 29

of the specification. Furthermore, in Example 6 of the specification, when the oxygen-absorbing agent of the present invention is used, the oxygen concentration was maintained at 0.16% in the container after one month, and the oxygen concentration was maintained at 0.42% after three months. When the oxygen-absorbing agent particle having a specific surface area of 0.4 m^2/g and an apparent density of 2.45 g/cc is used (Comparative Example 6-1), it is shown that the oxygen concentration in the container after one month was 0.40%, and the oxygen concentration after three months was 0.95%.

Furthermore, in the present invention, the oxygen-absorbing agent particles having an aspect ratio (short axis size/long axis size) of 0.6 or below are present in an amount of at least 50%, and the oxygen-absorbing agent particles are a flat or spindle-shaped particle having a compression degree of at least 20%. The above characteristics are also important with regard to oxygen-absorbability and the appearance properties of the container.

The effect of this aspect of the invention is described at page 12, line 30 to page 13, line 29 of the specification.

In Example 7 of the specification, when the oxygen-absorbing agent particles having the properties satisfying the above-mentioned conditions are used, the oxygen concentration after one month in the container was 0.16%, and the oxygen concentration after three months was maintained at 0.42%, and in addition, the outside appearance of the container after oxygen absorption was good. When the oxygen-absorption agent contains particles having an aspect ratio larger than 0.6 in an amount of at 60% (Comparative Example 7-1), it is shown that the

oxygen concentration in the container after one month was 0.34% and the oxygen concentration after three months was 0.76%, and the appearance of the container became poor.

PATENTABILITY OVER CITED REFERENCES AND PRIOR ART

Claims 1 to 13 were rejected as being unpatentable over Otaki et al. However, all of the limitations of claims 1 to 13 are described in parent U. S. Patent Application No. 08/954,077 from which Applicants claim benefit under 35 U.S.C. § 120. Applicants are thus entitled to the October 20, 1997 U.S. filing date of parent application No. 08/954,077 which antedates the January 14, 1998 publication date of Otaki et al. Therefore, the Otaki et al reference is not effective prior art under 35 U.S.C. § 102, and withdrawal of the foregoing rejection with respect to claims 1-13 is respectfully requested.

Claims 14 and 15 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Otaki et al in view of Koyama et al. The subject matter of new claims 14 and 15 relies for its support on material added with the filing of the CIP application. Therefore, Otaki et al is available as prior art against these claims.

Applicants respectfully traverse the rejection of claims 14 and 15 for the following reasons.

Claims 14 and 15 depend from claim 1, and therefore include all the limitations of claim 1.

Otaki et al. describe the compounding of an oxygen-absorbing agent in the blend of a plurality of resins. However, Otaki et al. do not describe nor suggest the following characteristics (A to C) of claim 1.

A. use of a resin matrix which is substantially non-compatible and which is composed of a blend of a plurality of thermoplastic resins and/or elastomers,

B. a plurality of resins and elastomers composed of a propylene polymer and an ethylene polymer,

C. a resin and/or elastomer which forms a layer-like distributed structure in the resin matrix.

Rather, Otaki et al., at page 4, lines 35 to 36, describe:

> Polyolefin such as polyethylene and polypropylene can preferably be used, because of a good compatibility with the thermoplastic elastomer or the ethylene-propylene copolymer.

Thus, Otaki et al recommends a combination of a resin and an elastomer which have good compatibility.

In contrast, in the present invention (claim 1), the use of polymers such as a combination of ethylene polymer and propylene polymer, having no compatibility makes it possible to form a layer-like distributed structure in a resin matrix into which an oxygen-absorbing agent is compounded. When the oxygen-absorbing agent is oxidized to give a volume expansion, this matrix having a layer-like distributed structure causes the peeling of layers on the interface having a multilayer distributed structure, forms spaces between layers, absorbs a volume expansion, and can obtain an advantage of preventing the destruction of the coating of the resin layer.

Otaki et al. do not describe nor suggest such a construction and effect of claim 1. Therefore, claim 1 is separately patentable over Otaki et al, and Applicants need not rely on the benefit of parent application No. 08/954,077.

Claim 14 relates to an oxygen-absorbing multilayer plastic cap which is molded from a laminated body obtained by laminating a thermoplastic resin containing no oxygen-absorbing agent on both sides of a layer composed of the oxygen-absorbing resin composition described in claim 1. Since claim 1 is patentable, claim 14 depending on claim 1 is also patentable over Otaki et al.

Claim 15 is directed to a liner material for caps which contains a liner composed of the oxygen-absorbing resin composition according to claim 1. Since claim 1 is patentable over Otaki et al, claim 15 depending upon claim 1 is also patentable over Otaki et al.

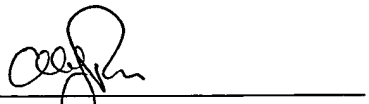
Koyama et al adds nothing of consequence which would adversely affect patentability of claims 14 and 15.

For the above reasons, it is submitted that claims 14 and 15 are patentable over Otaki et al in view of Koyama et al, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1 and 4-15 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 2, 3 and 16-19 are canceled.

The claims are amended as follows:

1. (Amended) A thermoplastic resin composition containing an oxygen absorbing agent, wherein a resin matrix of the thermoplastic resin composition is substantially non-compatible and is composed of blends of a plurality of thermoplastic resins [and] and/or elastomers, one of the non-compatible thermoplastic resins and/or elastomer being a propylene polymer, and the other being an ethylene polymer, and the thermoplastic resins [and] and/or elastomers form a [non-uniformly] multilayer distributed structure in the resin matrix.

11. (Amended) An oxygen-absorbing agent comprising[;] oxygen-absorbing agent particles which comprise a reducing iron powder and an oxidation-promoting agent or a catalyst firmly adhered to surfaces of said reducing iron powder, and which has a specific surface area of not smaller than 0.5 m^2/g and an apparent density of not larger than 2.2 g/cc, and in which the oxidation-promoting agent or the catalyst is present in an amount of from 0.1 to 5% by weight per the reducing iron powder, wherein the oxygen absorbing agent particles have an average particle diameter of 10 to 50 μm as measured by a laser scattering method and an aspect ratio (short axis size/long axis size) of 0.6 or below being present in an amount of at least 50% and is a flat or spindle-shaped particle having a compression degree of at least 20%.